MISSOURI DEPARTMENT OF TRANSPORTATION
MATERIALS ENGINEERING
Jefferson City, Missouri

Test Method
MoDOT T52
DETERMINATION OF MAGNESIUM CHLORIDE IN MAGNESIUM CHLORIDE BRINE

1.0 SCOPE

1.1 This method describes a procedure for determining the percent Magnesium Chloride in Magnesium Chloride brines by atomic absorption spectroscopy.

2.0 REAGENTS AND APPARATUS

2.1 An Atomic Absorption Spectrophotometer.

2.2 Hydrochloric Acid (HCl), Sp. Gr. 1.19.

2.3 Lanthanum Oxide (La_2O_3), reagent grade.

2.4 1000 ppm Magnesium stock solution. This solution can be purchased from a number of sources or it can be prepared in the laboratory from a suitably pure Magnesium salt.

3.0 PREPARATION OF STOCK SOLUTIONS

3.1 Lanthanum stock solution - 10 percent. Add 200 ml of distilled water to 117.28 g of Lanthanum Oxide (La_2O_3) in a 2000 ml beaker. While stirring, carefully add 500 ml of Hydrochloric Acid. When solution is complete, cool to room temperature, transfer to a 1000 ml volumetric flask and dilute to volume with distilled water.

3.2 30 ppm Magnesium stock solution. Pipette 30 ml of 1000 ppm Magnesium stock solution into a 1000 ml volumetric flask and dilute to volume with distilled water.

4.0 PREPARATION OF STANDARD SOLUTIONS

4.1 Blank solution. Pipette 10 ml of Lanthanum stock solution into a 100 ml volumetric flask and dilute to volume with distilled water.

4.2 23.5% $MgCl_2$. Pipette 20 ml of 30 ppm Magnesium stock solution and 10 ml of Lanthanum stock solution into a 100 ml volumetric flask and dilute to volume with distilled water.

4.3 29.3% $MgCl_2$. Pipette 25 ml of 30 ppm Magnesium stock solution and 10 ml of Lanthanum stock solution into a 100 ml volumetric flask and dilute to volume with distilled water.

5.0 PROCEDURE

5.1 Weigh, to the nearest 0.1 mg, 0.5 g of brine into a 1000 ml volumetric flask and dilute to volume with distilled water. Transfer by pipette, a 20 ml aliquot to a 100 ml volumetric flask. Pipette 10 ml of Lanthanum stock solution into the 100 ml volumetric flask and dilute to volume with distilled water.

5.2 Calibrate the instrument using the blank solution and the 23.5% and 29.3% Magnesium standard solutions, then determine % $MgCl_2$ on the sample solution.

6.0 CALCULATION AND REPORT

6.1 The method of calculation will vary with the make and model of the instrument used. Report the percent Magnesium Chloride to the nearest 0.1% as follows:

% Magnesium Chloride ($MgCl_2$)